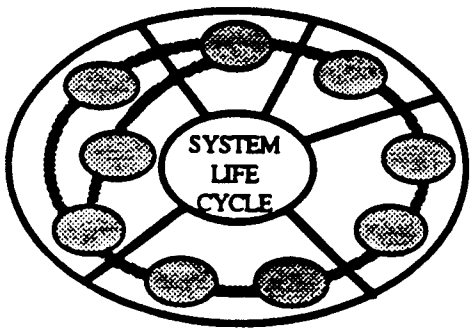
OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE (OSWER)



SYSTEM LIFE CYCLE MANAGEMENT GUIDANCE

Part 1: Overview

OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE
SYSTEM LIFE CYCLE MANAGEMENT GUIDANCE

TABLE OF CONTENTS

Part 1: Overview		Page
1.	Introduction	1-1
2.	Overview of the System Life Cycle	2-1
3.	Key Principles	3-1
	Appendix A	A-1
	Appendix B	B-1

1. INTRODUCTION

1.1. Purpose of this Guidance. OSWER's System Life Cycle Management Guidance provides a structured approach for the solution of information management problems, particularly those that require consideration of automated systems. It addresses the determination and accomplishment of the solution and, for automated systems, also addresses the ongoing management and support of the system.

This Guidance has two objectives:

- To explain the importance, objectives, and benefits of system life cycle management to all potential participants in the system life cycle.

- To describe the progression of the life cycle through individual phases and stages, in terms of their respective objectives, activities, decisions, and products, and to describe the relationships among the phases and stages.

This Guidance has been developed to address a wide range of information systems, including modeling and expert systems. Systems that support OSWER programs vary greatly in size, scope of application, complexity of processing, technologies used, and the methodologies and tools used to support the evolution of the system from initial problem statement through the operation and ultimate termination of the system. Such variation reflects the diversity of OSWER programs. Thus, this Guidance does not prescribe a single method, or present a "cookbook" approach applicable without change to every system. Rather, it presents a structured, disciplined approach for solving problems, and for selecting and using the methods, tools, and techniques appropriate to each problem.

1.2. Authority. This Guidance has been prepared under the following authorities:

(1) The Paperwork Reduction Act of 1980 (Public Law 96-511, as amended);

(2) The Brooks Act (Public Law 89-306);

(3) Office of Management and Budget Circulars A-109 (Major Systems Acquisitions), A-123 (Internal Control Systems), and A-130 (Management of Federal Information Resources);

(4) Federal Information Resource Management Regulation (FIRMR);

(5) National Bureau of Standards Federal Information Processing Standards Publications 38 (Guidelines for Documentation of Computer Programs and Automated Data Systems), 64 (Guidelines for Documentation of Computer Programs and Automated Data Systems for the Initiation Phase), 101 (Guideline for Lifecycle Validation, Verification, and Testing of Computer Software), and 105 (Guideline for Software Documentation Management); and

(6) EPA Information Resources Management Policy Manual.

1.3. Scope. This Guidance should be utilized on all information systems projects that relate to OSWER programs. However, the specific participants in the life cycle process, and the necessary reviews and approvals, vary from project to project. These are explained in Part 3 of this Guidance, Practice Papers.

1.4 Benefits of System Life Cycle Management. System life cycle management represents the accumulation of many years of experience by information management professionals, and many lessons learned. OSWER's Guidance builds on this experience, taking advantage of other organizations' experience and resulting guidance as well as experience specific to OSWER. It is intended to help ensure that each information system project is successful and avoids learning (or relearning) the pitfalls and lessons of information systems the hard way. Specific benefits expected include:

- Ensuring full consideration of the OSWER program environment, and associated system and data requirements, from project initiation through the entire life of the system;

- Providing early identification of technical and management issues, thus avoiding investments of resources in impractical or infeasible system features;

- Providing an early view of total resource needs (including resources needed for continued operations) to ensure that decisions regarding system capabilities consider the full cost of these capabilities, and refining this view throughout the life cycle;

- Fostering realistic expectations by the user community (program managers and staff) of what the system will and will not accomplish;

- Providing a balanced consideration of the programmatic, technical, and management, and cost aspects of proposed system modifications;

- Encouraging periodic evaluations to identify systems which may no longer effectively support program needs, or may consume disproportionate resources;

- Providing clear measures of system progress and status, to enable effective corrective action if needed; and

- Providing much of the information needed to support information resources management planning and the development of IRM budget requests.

1.5 Organization of System Life Cycle Management Guidance. This Guidance is organized into three parts as follows:

- **Part 1, System Life Cycle Management Overview** -- Describes the benefits and key principles of life cycle management and provides a summary of the system life cycle in terms of the objectives, decisions, and products for each phase and stage. Part 1 also identifies certain important functions that cut across the entire life cycle.

- **Part 2, System Life Cycle Management Description** -- Provides a detailed description of the objectives, activities, decisions, and products of each life cycle phase and stage, and presents a life-cycle wide synopsis of key crosscutting considerations. Includes a glossary and comprehensive outlines of system life cycle products.

- **Part 3, System Life Cycle Management Practice Papers** -- Provides more in-depth guidance on topics of particular importance to OSWER. Each practice paper addresses a single topic related to the implementation of life cycle management, ranging from the reviews and approvals of life cycle products to potential tools and methodologies for particular life cycle activities. Part 3 of this Guidance will be revised and expanded over time to reflect OSWER's needs and experience in implementing system life cycle management.

1.6. Related Guidance and Standards. This Guidance has been developed to incorporate the direction provided by the EPA System Design and Development Guidance prepared by the Office of Information Resources Management (OIRM). Projects conducted in accordance with the OSWER System Life Cycle Management Guidance will be in full conformance with the OIRM Guidance. OIRM and the National Data Processing Division (NDPD) issue guidance and standards for the use of specific software products, which are to be followed by any project that utilizes those products.

This Guidance also reflects OSWER's emphasis on improved data administration within the life cycle. Specific data administration practices are described in Part 3 of this Guidance.

2. OVERVIEW OF THE SYSTEM LIFE CYCLE

2.1. Introduction.

Life cycle management represents a structured approach to solving an information management problem. It addresses a broad range of activities, starting with the initial identification of the problem, progressing through the building or acquisition of a solution, and ending with the final disposition of the solution at the end of its useful life. In many instances the solution will take the form of an automated information system. However, OSWER's view of system life cycle management does not assume an automated solution; it focuses first on the problem to be solved and then on the solution.

OSWER's practice of system life cycle management is intended to be flexible in nature. This Guidance provides the flexibility to select the methods, tools, and technologies that are appropriate to solving each information management problem, and permits refinement of the basic life cycle as appropriate for a given problem. However, this flexibility exists within a framework that requires the active participation of OSWER program managers and information management professionals throughout the life cycle.

This section provides an overview of the OSWER system life cycle. It briefly describes the overall structure of the life cycle in terms of specific phases and stages, with a focus on the objectives, key decisions, and products of each. This section also highlights certain topics that are crosscutting in nature. A more detailed description of the life cycle, including a description of the activities performed in each stage, is presented in Part 2 of this Guidance.

2.2. Life Cycle Structure.

The system life cycle consists of five major phases, with the largest phases divided into two or more stages. These phases and stages are as follows:

Phase	Stage(s)
Initiation	Initiation
Concept	Concept
Definition and Design	Definition
	Design
Development and Implementation	Development
	Implementation
Operation	Production
	Evaluation
	Archive

Exhibit 2-1 illustrates the structure of the system life cycle. Following it is a brief summary of each life cycle phase.

- Initiation -- Identifies the information management problem to be solved, with a focus on the pertinent information, organizations experiencing the problem, timeframe available for establishing the solution, and overall value of the solution.

- Concept -- Provides a high-level, comprehensive model of the solution to the problem, which will guide the effort in subsequent phases. This phase defines high-level functional and data requirements and evaluates alternative solutions to these requirements. The solutions address all aspects of the system: the information to be processed; functional processing capabilities; hardware, software, and communications to be used; and project organization and staffing through the end of the system life cycle.

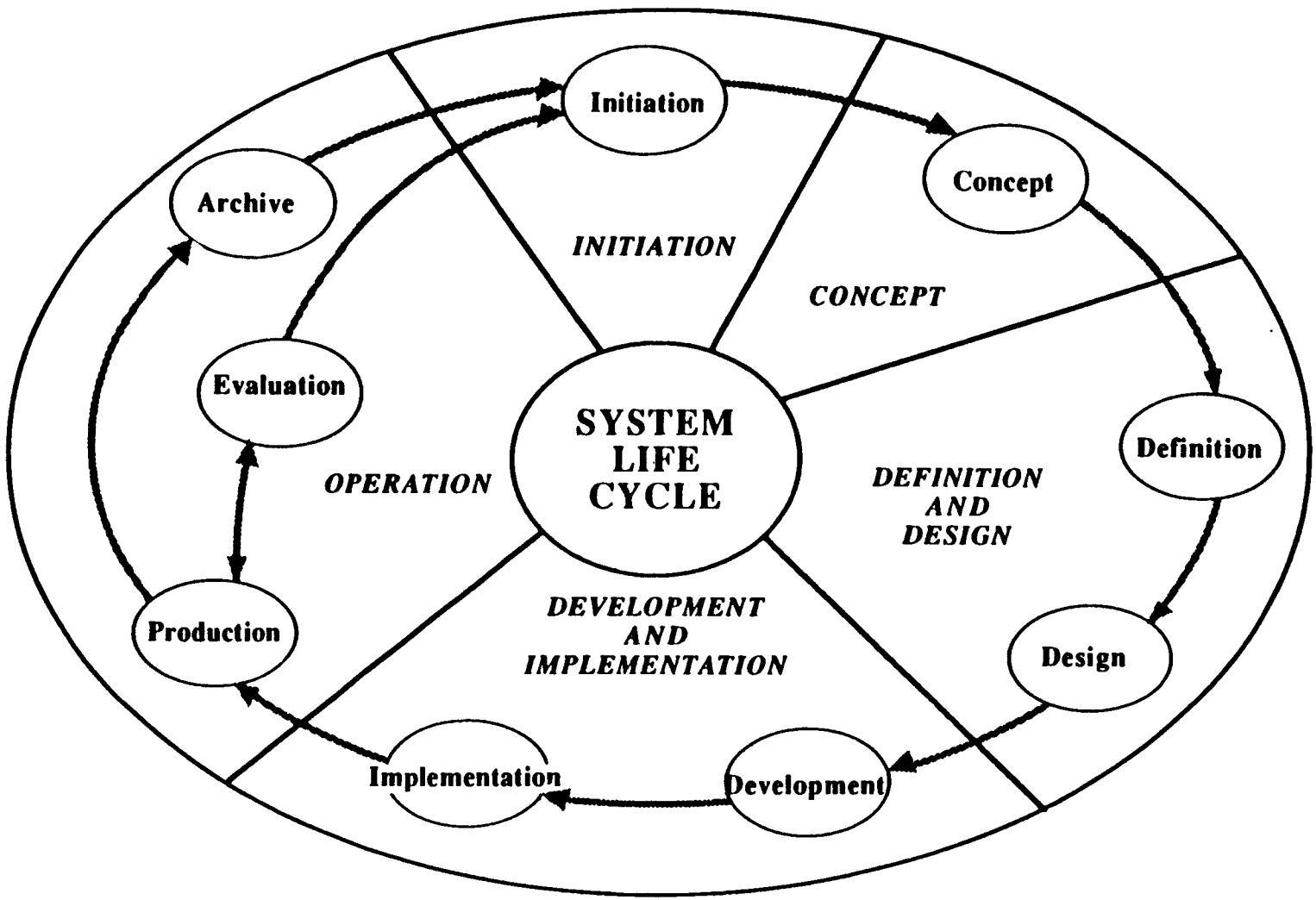
- Definition and Design -- Provides a detailed description of the information and processing capabilities required of the system, and subsequently a detailed description of how the system will provide these capabilities. This phase addresses the details of manual procedures as well as automated components of the system.

- Development and Implementation -- Acquires or builds the system in accordance with the prescribed design, and installs the system in the production environment in which it will be available to the users. This phase also converts needed data into the new system, and trains users and system support staff prior to the start of full system operation.

- Operation -- Provides the full capabilities of the system to the users, and ensures adequate ongoing support for the system. This phase includes system modifications, periodic formal evaluations of the system, and the ultimate termination and archiving the system at the end of its useful life.

The duration of each phase and stage, and associated levels of effort, will vary considerably from system to system. However, the relative duration of each stage for many systems will follow the progression outlined below:

EXHIBIT 2-1: THE OSWER SYSTEM LIFE CYCLE



Phase/Stage	Duration
Initiation	Very short
Concept	Short to moderate
Definition	Moderate to long
Design	Moderate to long
Development	Moderate to long
Implementation	Moderate
Production	Very long
Evaluation	Very short
Archive	Short to moderate

Application of systems analysis, design, and/or development tools will tend to reduce the duration of the stages in which they are used, potentially as early as the Concept phase. Certain methodologies and tools, such as those associated with program code generators, will also tend to alter the relative duration of different stages.

For some information management problems and systems, it may be desirable to alter the life cycle structure. For very simple systems (e.g., single-user applications), it may be appropriate to combine parts of phases or stages. For projects using iterative methodologies such as rapid prototyping, some phases or stages may overlap. For very large or complex systems, it may be appropriate to divide the system into major subsystems or other partitions and manage the evolution of each subsystem through its own life cycle. For these systems, it will be important to develop project team structures and other mechanisms to ensure effective coordination across subsystems. In tailoring the life cycle to suit a particular situation, three considerations are of particular importance:

- The tailoring of the life cycle is to be clearly documented in the Project Management Plan for the system.
- All decisions regarding project approach, execution, and continuation are to be made explicitly (i.e., not by default or accident), and no later than the completion of the corresponding stage in the life cycle.
- System reviews and approvals are to be specifically included in any tailoring of the life cycle to ensure appropriate program management participation and oversight. As appropriate, reviews and approvals designated in this guidance may be consolidated to reflect the consolidation of individual stages or phases.

The OSWER system life cycle has been structured to provide a fair degree of flexibility in solving information management problems. Tailoring should be well thought out, documented, and approved in advance. New project managers, in particular, should

consult the program office Information Management Coordinator, or the Office of Program Management and Technology, Information Management Staff, for guidance in tailoring the life cycle to the needs of specific projects.

2.3. Overview of Life Cycle Phases and Stages.

Exhibits 2-2 through 2-10 illustrate the nine stages of the system life cycle. For each stage the corresponding exhibit identifies its objectives, key decisions, and products. These topics, and the activities performed in each stage, are described in greater detail in Part 2 of this Guidance.

2.3.1. Objectives. The objectives represent the expected major accomplishments of a life cycle stage. Each stage has from one to five objectives.

2.3.2. Key Decisions. The key decisions represent significant issues to be resolved by the project team during the life cycle stage. Some decisions will require program management approval. There are three types of decisions: project approach, project execution, and project continuation.

- Project approach decisions address the organization of the project, methods and tools to be used, and the participants in project activities such as system acceptance testing, reviews, and approvals.

- Project execution decisions address the scope and specific features of the system. These decisions address programmatic, technical, and system support related issues.

- Project continuation decisions address issues relating to the continued need for the system and the availability of funding and other needed resources.

Some decisions may be very simple, while others may require a great deal of effort; but they must all be addressed explicitly to ensure that they are made in a well-reasoned manner, rather than being overlooked or made by default. How well all three types of decisions are made, and the timeliness of decisions, are crucial to the system's ultimate success in solving the information management problem.

2.3.3. Products. Typically, many products are produced in the course of the system life cycle. Very few of those products remain unchanged throughout the system life cycle. Some, like the Project Management Plan, evolve continuously during the life cycle; others, like the System Concept, are revised to reflect the results of analyses performed in later stages. This Guidance identifies the products generated during each stage, including potential updates to products generated during prior stages. For each, the Guidance presents a topical outline (see Part 2 of the

Guidance). Although it is not always necessary to follow the outline precisely, it is important to document the subject matter contained in each outline. Some analytic methodologies or tools provide documentation or other output corresponding to all or part of a life cycle product; in such cases, these outputs should be used to satisfy the corresponding portion of the outline, supplemented by other documentation as appropriate.

2.4. Crosscutting Considerations.

There are a number of concerns which exist throughout the life cycle for every system, and which are addressed in multiple phases or stages. These concerns are summarized below and are discussed in greater detail in Part 2 of this Guidance.

- Project Management Plan. The Project Management Plan is the crucial document of the system life cycle. It is first produced in the Initiation phase, and is updated, expanded, and refined continually throughout the life cycle. It covers project scheduling, staffing, resources, adjustments to the life cycle structure, selection of tools and methodologies, identification of applicable reviews and approvals, configuration management methods, and other related topics. The Project Management Plan is subject to review and approval by OSWER program management.

- Project Reviews/Quality Assurance. Formal project reviews and other quality assurance activities are conducted throughout the system life cycle to ensure that the system ultimately established is sound programmatically, technically, and from a system management perspective. Reviews help to ensure that key issues are identified and addressed appropriately as early as possible in the life cycle, to avoid major, expensive rework in later stages. Reviews provide feedback to the project team and also advise program management in support of required system approvals. Specific organizations and individuals who are to participate in project reviews and related activities are designated early in the life cycle, and are selected to reflect the nature of the information management problem and the recommended solution.

- Project Approvals. Formal approvals occur at designated points in the life cycle to confirm program management support of the project and the resulting system. Conducting reviews and obtaining approvals is not the goal of the life cycle process, but a is key means to the desired end: successfully solving an information management problem. Program management approvals are obtained in all stages from Initiation through Implementation. The specific selection of organizations and individuals to provide approvals for a specific

project is tailored to meet the specific characteristics of the information management problem and the proposed solution.

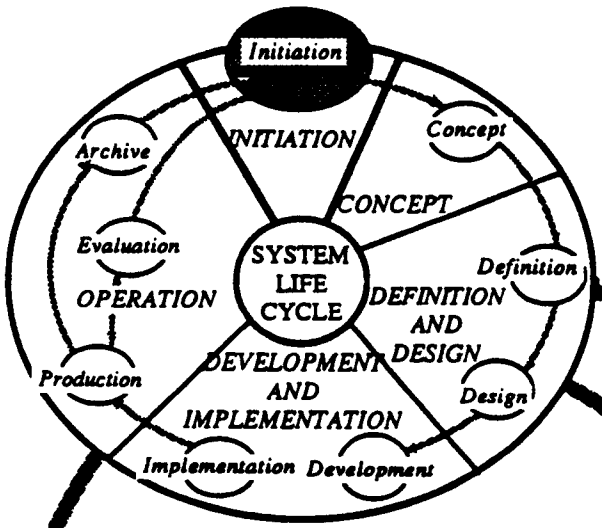
- Configuration Management. Continual, consistent documentation of the development and evolution of the system is essential to ensure that at all points in the system life cycle, key analyses and decisions are recorded, the system can be accurately described, and there is consensus on what is required and what has been delivered. Configuration management serves to maintain a controlled library of life cycle products (automated products such as software as well as documentation), and to provide a process for the consideration and disposition of requested modifications to the system.

- Data Administration. To ensure effective management of OSWER's data resources, all systems are created and maintained in accordance with OSWER's data administration policy and practices. Life cycle activities are carried out consistent with the existing and planned data management environment, and data administration concerns are addressed at all phases of the life cycle.

- Methodologies and Tools. All systems created and maintained by OSWER use clearly articulated methodologies and modern system development (and maintenance) tools to the greatest extent practical. These are identified early in the life cycle to ensure their compatibility across phases and stages. Specific selections are confirmed in subsequent stages as appropriate. However, no methodologies or tools can replace the application of system life cycle management. For example, prototyping may be used as a method of performing design or development tasks; but the final products always include the documentation and reviews prescribed by the life cycle guidance. Use of expert system development tools may require that some activities are performed in a different sequence and/or iteratively; but again, they are documented and reviewed as prescribed by the life cycle management model.

- Benefit-Cost Analysis. At each phase or stage, information is gathered and decisions are made that enable the project team to make increasingly accurate projections of the total cost and benefits of the system over its life cycle. A preliminary assessments of costs and benefits is made no later than the Concept phase, and is refined and updated as appropriate throughout the remainder of the life cycle.

EXHIBIT 2-2: OVERVIEW OF INITIATION PHASE



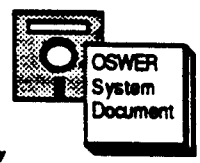
OBJECTIVES

Identify an information management problem.

Decide whether to commit resources to exploring ways to solve the problem.

DECISIONS

APPROACH	Who will manage the project? What reviews are necessary and what individual(s)/organization(s) should participate? What approvals are necessary and what individual(s)/organization(s) should participate? What methodologies and tools will be used in the Concept phase? What special assistance or notification is needed? What is the source of funding?
EXECUTION	What is the problem, and for what organization(s)? What new information needs are associated with this problem? How broad a scope should the solution cover?
CONTINUATION	Does a significant information management problem exist? Is developing a new system potentially the best way to address the problem? Is the initial estimate of project scale in line with the anticipated benefits?

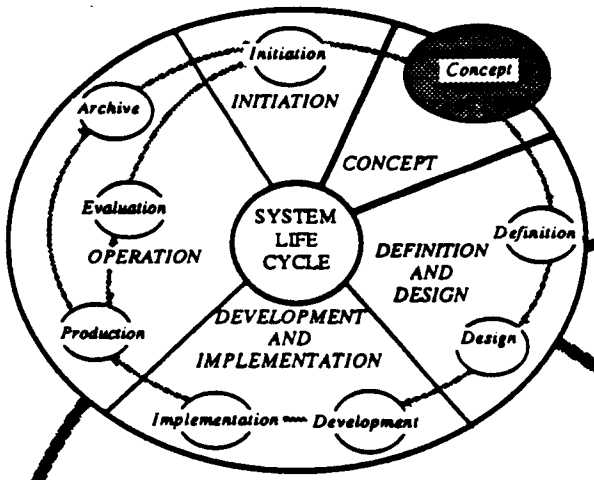


PRODUCTS

Initiation Decision Paper

Project Management Plan

EXHIBIT 2-3: OVERVIEW OF CONCEPT PHASE



OBJECTIVES

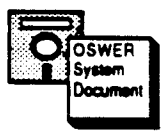
Confirm the information management problem.

Identify at a high level requirements for a solution to the problem.

Describe a feasible, timely, cost-effective solution to the problem.

DECISIONS

APPROACH	How should the effort be organized? What is the system life cycle strategy? What methodologies and tools will be used? What is the procurement approach? Should funding be obtained for the full life cycle, and by whom?
EXECUTION	What are the high-level functional requirements? What are the high-level data requriements? Who are the user organizations? Can the problem be solved with existing system/data resources? What parts of the system/data will be automated? Manual? What is the overall architecture of the system/data? To what extent will the system/data interface with existing systems/data? What elements of system operation will be centralized? Distributed? How will technical, programmatic, and other risks be addressed? What is the maintenance strategy?
CONTINUATION	Does the information management problem continue to exist? Does the system concept address the problem sufficiently to permit continuing to the Definition stage? Are sufficient funding and other resources available for the entire system life cycle?



PRODUCTS

New:

System Concept

System Test Document

Acceptance Test Document

Data Management Plan

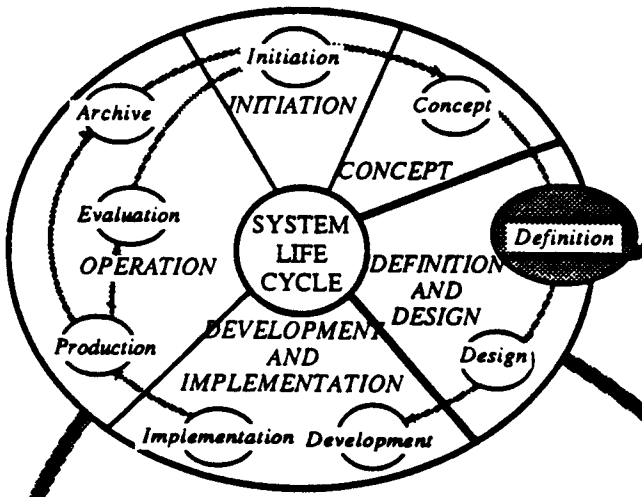
Concept Decision Paper

Updated:

Initiation Decision Paper

Project Management Plan

EXHIBIT 2-4: OVERVIEW OF DEFINITION STAGE



OBJECTIVES

Determine specific, detailed functional requirements.

Determine specific, detailed data requirements.

Confirm suitability of system concept.

DECISIONS

APPROACH	What specific methodologies and tools will be used in the Design stage?
EXECUTION	What are the detailed functional requirements and their priorities? What are the detailed data requirements? What potential requirements will not be included in the system? What modifications are needed to the system concept?
CONTINUATION	Does the information management problem continue to exist? Do the detailed requirements address the problem sufficiently to permit continuing with the Design stage? Are sufficient funding and other resources available for the entire system life cycle?

PRODUCTS

<u>New:</u>

Configuration Accounting Records

Detailed Functional Requirements

Detailed Data Requirements

Definition Decision Paper

Requirements Data Dictionary

<u>Updated:</u>

Initiation Decision Paper

System Concept

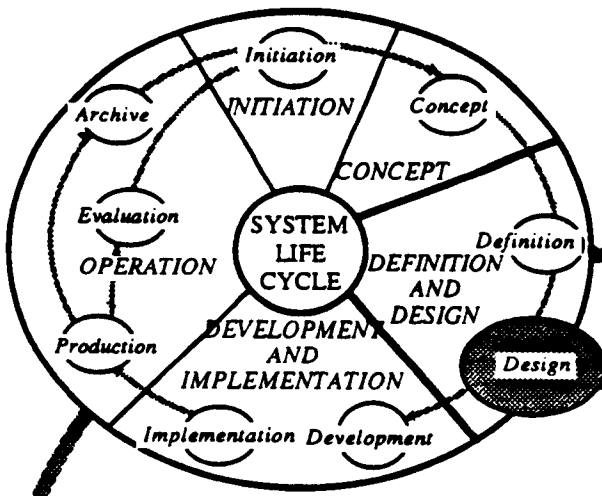
Project Management Plan

Data Management Plan

System Test Document

Acceptance Test Document

EXHIBIT 2-5: OVERVIEW OF DESIGN STAGE



OBJECTIVES

Establish a complete design for the system:

- Data Base
- Input, Output and Internal Processing
- Hardware, Software & Communications Environment
- Manual Procedures
- Data Conversion
- User Support

DECISIONS

APPROACH	What specific methodologies and tools will be used in the Development and Implementation stages? How will user support be provided? How will development and implementation be phased? How will newly identified risks and issues be handled?
EXECUTION	What packaged software will be incorporated in the system? What modifications must be made to the system concept or detailed requirements? What modifications will be made to current procedures? What modifications will be made to current systems/data bases or to other systems/data bases under development? How will conversion of existing data take place?
CONTINUATION	Does the information management problem continue to exist? Does the system design address the problem sufficiently to continue with the Development stage? Are sufficient funding and other resources available for the remainder of the life cycle?

PRODUCTS

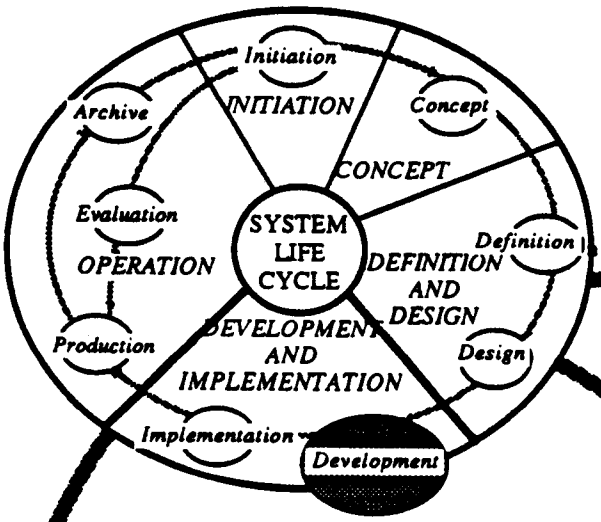
<u>New:</u>

- System Design
- Design Decision Paper
- Physical Data Base Design
- Design Data Dictionary

<u>Updated:</u>

- Initiation Decision Paper
- System Concept
- Configuration Accounting Records
- Detailed Functional Requirements
- Detailed Data Requirements
- Requirements Data Dictionary
- Project Management Plan
- Data Management Plan
- System Test Document
- Acceptance Test Document

EXHIBIT 2-6: OVERVIEW OF DEVELOPMENT STAGE



OBJECTIVES

Acquire hardware, data communications, and systems software.

Develop/acquire application software.

Develop user procedures and support mechanisms.

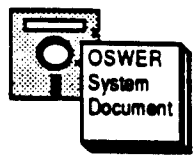
Create and/or modify data base(s).

Confirm that the system is ready for implementation.

DECISIONS

APPROACH	What individuals will participate in the acceptance testing?
EXECUTION	How should new requirements be handled? What modifications must be made to the system concept, detailed requirements, or design? Have security and backup issues been identified and resolved? Have all uncertainties been adequately addressed?
CONTINUATION	Does the information management problem continue to exist? Does the developed system address the problem sufficiently to be implemented? Are sufficient funding and other resources available for the remainder of the life cycle?

PRODUCTS



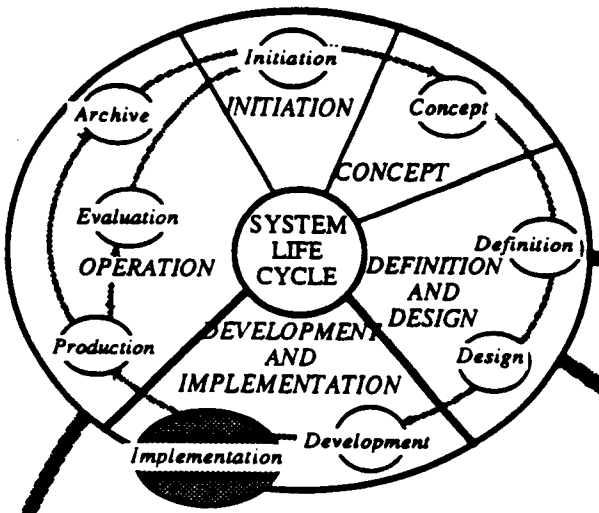
New:

- Development System
- Development Data Base(s)
- Maintenance Manual
- User Manual
- Operation Manual
- Security Manual
- User Support Materials
- Development Decision Paper

Updated:

- Initiation Decision Paper
- System Concept
- Configuration Accounting Records
- Detailed Functional Requirements
- Detailed Data Requirements
- Requirements Data Dictionary
- System Design
- Physical Data Base Design
- Design Data Dictionary
- Project Management Plan
- Data Management Plan
- System Test Document
- Acceptance Test Document

EXHIBIT 2-7: OVERVIEW OF IMPLEMENTATION STAGE



OBJECTIVES

Establish the system in the production environment.

Convert the data base(s) and data to the production environment.

Prepare affected personnel.

Confirm that the system is ready for operation.

DECISIONS

APPROVAL	What specific post-implementation evaluation methodologies and tools will be used?
EXECUTION	Which changes/enhancements should be made now? Deferred to the Production stage?
CONTINUATION	Does the information problem continue to exist? Does the developed system address the problem sufficiently to be placed in production? Are sufficient funding and other resources available for the remainder of the life cycle?

PRODUCTS

New:

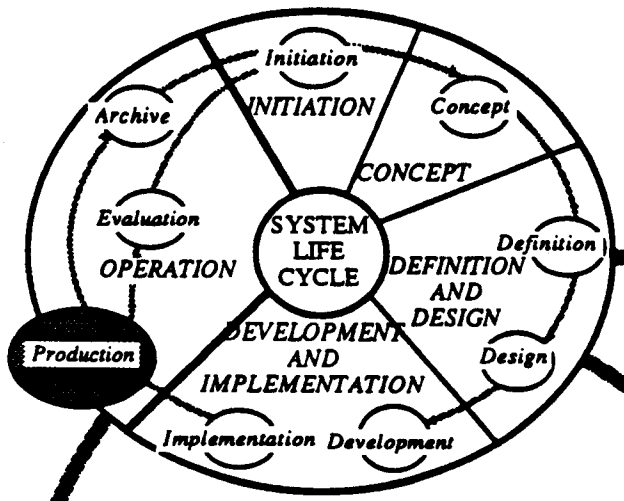
- Production System
- Production Data Base(s)
- Production Data Dictionary
- Implementation Decision Paper
- Training Report

Updated:

- Initiation Decision Paper
- System Concept
- Configuration Accounting Records
- Detailed Functional Requirements
- Detailed Data Requirements
- Requirements Data Dictionary
- System Design
- Physical Data Base Design
- Design Data Dictionary
- Development System
- Development Data Base(s)
- Reference Manuals *
- User Support Materials
- Acceptance Test Document
- Project Management Plan
- Data Management Plan
- System Test Document

* Multiple Products (Maintenance Manual, etc.)

EXHIBIT 2-8: OVERVIEW OF PRODUCTION STAGE



OBJECTIVES

Use the system to solve the information management problem.

Identify potential modifications needed to ensure that the system and data continue to solve the information management problem.

Develop and implement maintenance changes and minor enhancements.

DECISIONS

APPROACH	What evaluations of the system/data should be conducted? What new or additional user support activities are needed?
EXECUTION	What changes/enhancements to the system/data base(s) are needed? Should a particular enhancement be implemented within this stage, or given its own life cycle?
CONTINUATION	None -- Continuation decisions are made as the result of system evaluations. See the Evaluation stage.

PRODUCTS

<u>New:</u>

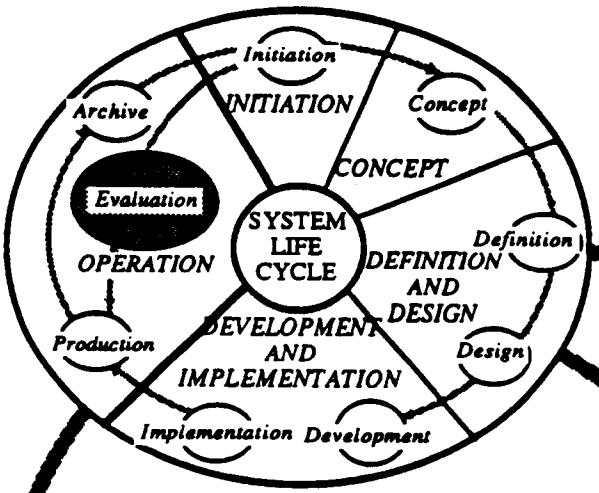
Performance Report

<u>Updated:</u>

Initiation Decision Paper
System Concept
Configuration Accounting Records
Detailed Functional Requirements
Detailed Data Requirements
Requirements Data Dictionary
System Design
Physical Data Base Design
Design Data Dictionary
Development System
Development Data Base(s)
Reference Manuals*
User Support Materials
Production System
Production Data Base(s)
Production Data Dictionary
Project Management Plan
Data Management Plan
System Test Document
Acceptance Test Document

* Multiple Products (Maintenance Manual, etc.)

EXHIBIT 2-9: OVERVIEW OF EVALUATION STAGE



OBJECTIVES

Determine if the system effectively and efficiently addresses the information management problem.

Determine whether the system should be continued, enhanced, or replaced/archived.

DECISIONS

APPROACH	What improvements in system/data functionality, quality, and/or performance are needed? What adjustments to the system/data management approach are needed?
EXECUTION	None. Evaluations do not change the system. Changes and minor enhancements to the system are made in the Production stage. Major enhancements are handled through individual life cycles. Termination of the system takes place in the Archive stage.
CONTINUATION	Does the information management problem continue to exist? Does the production system address the problem sufficiently to be continued in production? Are sufficient funding and other resources available for the remainder of the life cycle?

PRODUCTS

<u>New:</u>

Post-Implementation Evaluation Report

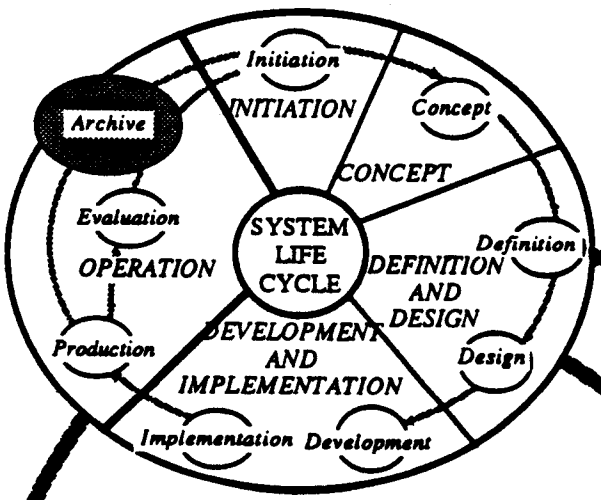
System Evaluation Report

<u>Updated:</u>

Project Management Plan

Data Management Plan

EXHIBIT 2-10: OVERVIEW OF ARCHIVE STAGE



OBJECTIVES

End the operation of the system in a planned, orderly manner.

Ensure that system components and data are properly archived or incorporated into other systems.

DECISIONS

APPROACH	None. The decision has been made to terminate system operation.
EXECUTION	What will be the system termination date? Which software components should be preserved? Which data should be preserved? What should be done with remaining equipment? How should life cycle products be archived?
CONTINUATION	None. The decision to continue using or to terminate the system is made as part of a system evaluation. See the Evaluation stage.

PRODUCTS

OSWER System Document

New:

- System Disposition Report
- Archived/Incorporated Data
- Archived/Incorporated Software
- Archived Life Cycle Products

Updated:

- Project Management
- Data Management Plan.

3. KEY PRINCIPLES

OSWER's System Life Cycle Management Guidance is a refinement of traditional system life cycle management approaches, reflecting a number of topics of particular interest to OSWER. The principles described below serve as the foundation for the life cycle management approach presented in the remainder of this Guidance.

3.1. System Life Cycle Management Should Be Used to Ensure a Structured Approach to Solving Information Management Problems. OSWER's life cycle management guidance describes an overall approach for achieving solutions to identified information management problems. Primary emphasis is placed on the decisions to be made and the proper timing of decisions. This Guidance provides the flexibility to tailor the approach to solve the problem at hand, enabling information system projects to combine phases, stages, and products, as appropriate, and to select the tools and methodologies best suited to solving the problem.

3.2. Each System Project Must Have an Accountable Sponsoring Organization. To help ensure effective planning, management, and commitment to information systems projects, each project must have a clearly identified sponsor. The sponsor serves in a leadership role, providing guidance to the project team and securing from senior management the required reviews and approvals at specific points in the life cycle.

3.3. A Single Project Manager Must be Appointed for Each System Project. This individual will have lead responsibility for the success of the project, and will work through a project team and other supporting organization structures (e.g., working groups, user groups) to accomplish the objectives of the project. Regardless of his/her organizational affiliation, the Project Manager is responsible for ensuring that project activities and decisions consider the perspectives of all affected organizations.

3.4. A Comprehensive Project Management Plan Is Required for Each System Project. The Project Management Plan is a pivotal element in the successful solution of an information management problem. This document describes how the life cycle management approach contained in this Guidance will be tailored to suit the specific characteristics of the project, and is used to provide direction to the many activities of the life cycle. It is developed in skeletal form during the Initiation phase, and is refined and expanded throughout the system life cycle.

3.5. Specific Individuals Must Be Assigned to Perform Key Roles Throughout the Life Cycle. Certain roles are considered vital to a successful system project, and at least one individual must be assigned to fulfill them on a full or part time basis as

appropriate. These roles include program management, program staff, quality assurance, and configuration management. For most projects, more than one individual should represent the actual or potential users of the system (i.e., program staff), and should be designated by the program manager(s) of the affected program(s) and organization(s).

3.6. Obtaining the Participation of Skilled Individuals Is Vital to the Success of the System Project. The skills of the individuals participating in a system project are the single most significant factor for the success of the project. This Guidance is not intended as a substitute for information management skills or experience. Individuals responsible for conducting system life cycle management projects are encouraged to obtain assistance from experienced information management professionals.

3.7. Complete and Accurate Documentation of Activity Results and Decisions Is Essential. Effective communication and coordination of activities throughout the life cycle depends on the complete and accurate documentation of decisions and the activities leading up to decisions. Undocumented, or poorly documented, activities and decisions can cause significant confusion or wasted efforts, and intensify the impact of turnover of project management or staff. Activities should not be considered complete, nor decisions made, until there is tangible documentation of the activity or decision.

3.8. Data Management Must be Emphasized Throughout the Life Cycle. OSWER considers the data processed by a system to be an extremely valuable resource due to the large volumes of data handled by OSWER systems, the increasing trend toward sharing data across systems and programs, and the importance of data quality. System life cycle activities stress the clear definition of data and the design and implementation of automated and manual processes to ensure effective data management; and are conducted in accordance with the policy and practices of OSWER's data administration program.

3.9. Each System Project Must Undergo Formal Reviews and Approvals. To help ensure that systems effectively address the targeted information management problem, each project is subject to formal review and approval. The reviews should be conducted by skilled professionals, examining tangible products from a programmatic, technical, and project management perspective. Reviews aid the project team as well as those who provide the required project approvals. Approvals are provided by a suitable level of program management, and confirm the continued commitment to the project scope, direction, and resource requirements in view of known risks and/or uncertainties.

3.10. Consultation with Oversight Organizations Aids the Success of a System Project. A number of oversight organizations external to OSWER (e.g., Office of the Inspector General, Office

of Information Resources Management, Procurements and Contracts Management Division) have responsibility for ensuring that information systems activities are performed in accordance with agency guidance and standards, and use available resources effectively. Each project team should work with these organizations as appropriate, and encourage their participation in the life cycle as early as possible to identify and resolve potential issues or sensitivities and avoid major disruption of the project.

3.11. A System Project Does Not Proceed Unless Resource Availability Is Clear. Beginning with the approval of the system concept, the continuation of a system project is contingent on a clear commitment from sponsoring program management. This commitment is embodied in the assurance that the necessary resources will be available -- not for the next stage only, but for the remainder of the life cycle. If at any time this commitment is seriously in question, or is withdrawn, the system project should not proceed.

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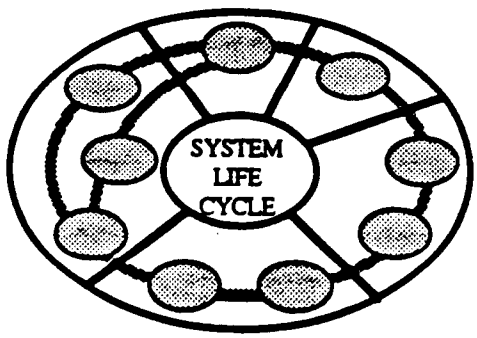
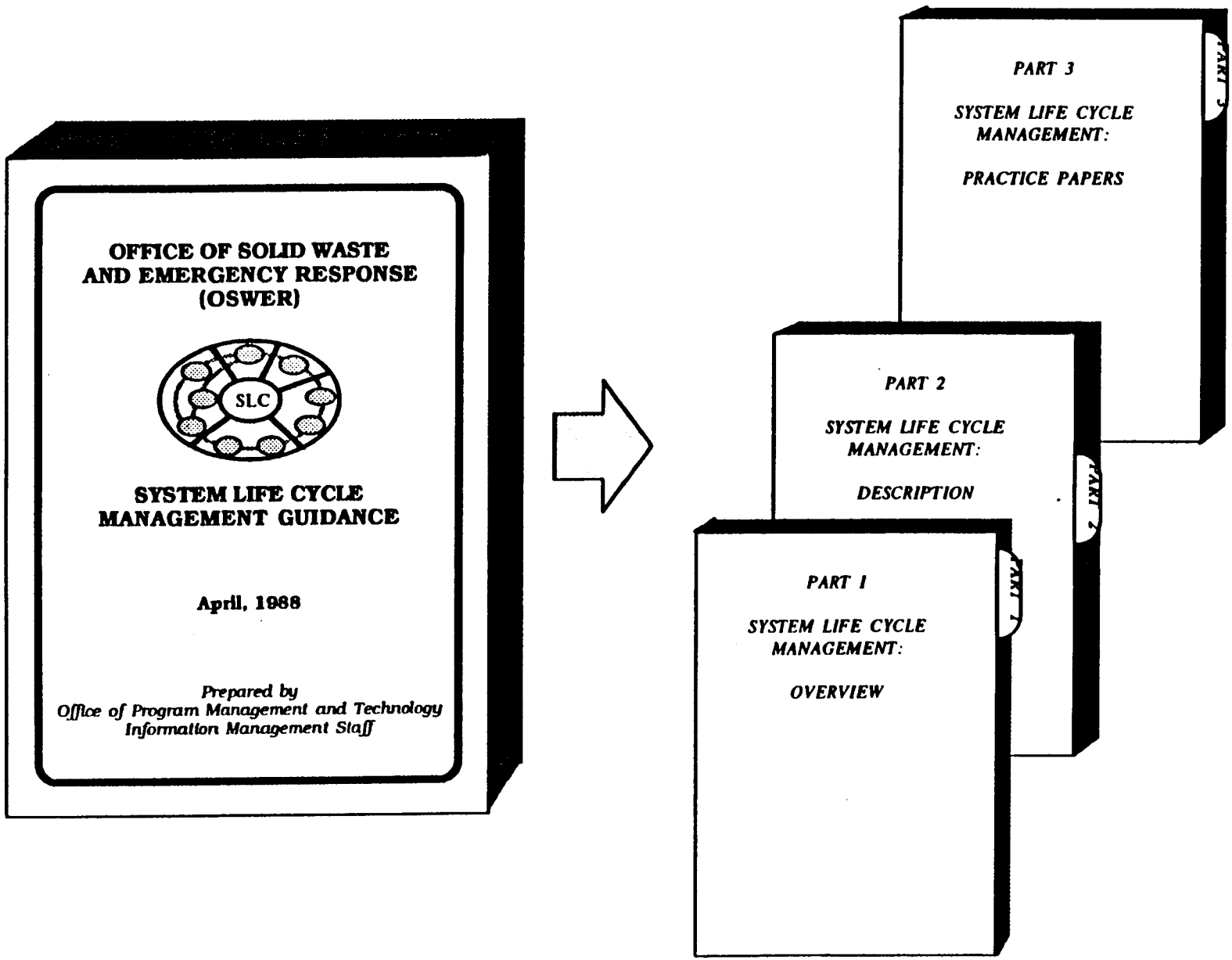


SYSTEM LIFE CYCLE MANAGEMENT GUIDANCE

Part 2: Description

STRUCTURE OF SYSTEM LIFE CYCLE MANAGEMENT GUIDANCE



OFFICE OF SOLID WASTE AND EMERGENCY RESPONSE
SYSTEM LIFE CYCLE MANAGEMENT GUIDANCE

TABLE OF CONTENTS

Part 2: Description		Page
1.	Phase I: Initiation	1-1
2.	Phase II: Concept	2-1
3.	Stage III-A: Definition	3-1
4.	Stage III-B: Design	4-1
5.	Stage IV-A: Development	5-1
6.	Stage IV-B: Implementation	6-1
7.	Stage V-A: Production	7-1
8.	Stage V-B: Evaluation	8-1
9.	Stage V-C: Archive	9-1
10.	Crosscutting Considerations	10-1
	Appendix A: Glossary	A-1
	Appendix B: Product Outlines	B-1